Space Weather Services

Vision

To provide the Nation with critical space weather services to protect life and property in space, in the air, at sea, and on land.

Concept of Operations

NWS provides real-time monitoring and forecasting of solar and geophysical events, develops techniques for forecasting solar and geophysical disturbances, and conducts applied research in solar-terrestrial modeling and physics. All of these activities are coordinated to deliver timely, accurate, and relevant information to the users of space weather products and services.

Customer and Partner Requirements

- ✓ Critical U.S. energy infrastructure including electric power grids.
- ✓ On-orbit satellite operations, including energy systems and computers.
- ✓ Telecommunications and GPS interests.
- ✓ Health and safety of astronauts, aviators, flight crews, and passengers.

Link to Science and Technology Infusion Plan

Space weather services leverage science and technology initiatives to increase the detection of events and the accuracy, specificity, and lead time of solar and geomagnetic forecasts. These advances in detection and warnings facilitate effective planning and decision making. Space weather efforts will increase the data quality and long-term continuity of related observations.

Prototype models for transition into operations will be developed and tested. There will also be expanded content and coverage of information and services to space weather customers and partners.

2005 Changes

- ✓ Ingest and display Polar Operational Environmental Satellite (POES)-18 satellite Space Environment Monitor (SEM) data.
- ✓ Prepare subscription service to assimilate all customer data.
- ✓ Upgrade hardware and software of legacy ingest systems.
- ✓ Receive Geostationary Operational Environmental Satellites (GOES)-N satellite data, following the scheduled December 2004 launch.

Science and Technology Requirements

- ✓ Improve and validate observations for space weather.

- ✓ Transition research models, products, and data into space weather operations.
- ✓ Develop and maintain space weather data and product distribution systems.
- ✓ Ensure observations of space weather and solar variability meet requirements for assessing long-term space climatology and global climate change.

Performance Measure

Measure	Baseline	FY 2004	FY 2005
Average ACE data availability*	90%	96%	97%

** A measure of the reception of data from the NASA Advanced Composition Explorer (ACE) satellite.*

Measure	Baseline	FY 2004	FY 2005
Skill score for moderate geomagnetic storm warnings	n/a**	.50	.52

*** The skill score for geomagnetic storm warnings was established in FY 2004.*

Milestones by Quarter

1st Quarter

- Transfer Space Environment Center (SEC) from the Office of OAR to NWS.
- Transition U.S. Total Electron Content (TEC) model into testbed.

2nd Quarter

- Transition planetary geomagnetic activity (A^P) prediction to testbed.
- Complete outer radiation belt electron loss study.

3rd Quarter

- Co-sponsor annual Space Weather Week in Boulder, CO.
- Prepare Webcast for WFOs about services to space weather customers.

4th Quarter

- Confirm and validate space weather data during post-launch test of GOES-N satellite.
- Implement operations of ground systems for GOES-N satellite data.
- Develop scientific training for NWS forecasters to facilitate their understanding of the potential impacts of space weather phenomena.

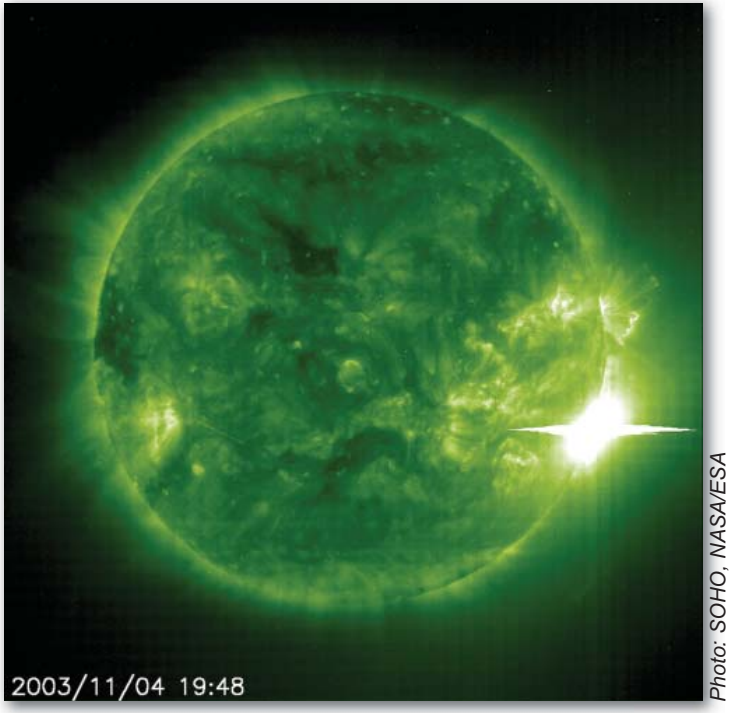

Photo: SOHO, NASA/ESA

The X-28 solar flare, which occurred November 4, 2003 over the western limb of the sun, is the largest and strongest solar flare observed to date.

Integrated Requirements

- ✓ Use SEC's current testbed to transition models developed with financial support from NSF, NASA, and DoD partners.
- ✓ Participate in the creation of a community-wide framework for space weather model development, similar to the Earth System Modeling Framework (ESMF).

Outreach

- ✓ Work closely with the U.S. Air Force in the operations of the joint Space Weather Operations Center at the SEC.
- ✓ Co-sponsor Space Weather Week in Boulder, CO.
- ✓ Participate in the second symposium on space weather at the 2005 annual AMS meeting in San Diego.
- ✓ Give tours of SEC facility to more than 150 students from the Boulder Valley School District.

Verification

Forecasts and products are verified against actual events when events are forecast. Times and descriptions of events are compared to forecasts, and a statistical measure of accuracy is used. Verifications are updated regularly, and are available at http://www.sec.noaa.gov/forecast_verification/index.html.

Contact Information

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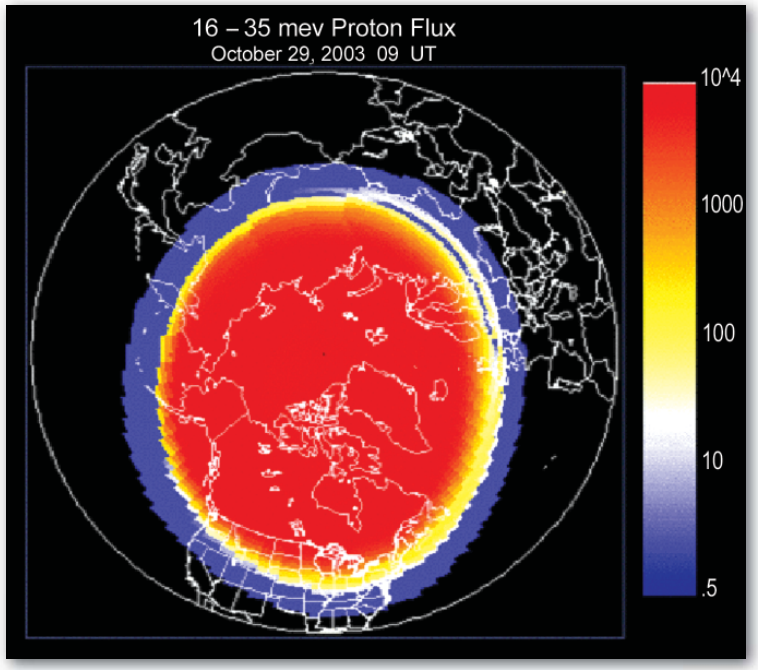

Polar region impacted by extreme level of solar particles during severe event of October 28-29,2003. This image was extrapolated from NOAA POES satellite data. Extreme levels of energetic particles affect airlines and high latitude short-wave communications.